Vitrified Salt Glazed Clay
SEWER PIPE

The Everlasting Material for Sewerage Construction

MADE OF

CLAY

Nature's
"BEST OF THE BEST"

Issued by

CLAY PRODUCTS ASSOCIATION
133 West Washington Street
CHICAGO, ILLINOIS
First Edition 1925

VITRIFIED SALT GLAZED

CLAY SEWER PIPE

—IS—

MANUFACTURED IN SIZES

4 INCHES to 42 INCHES

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"Build for Eternity
with Glazed Clay
—Tested by
Nature and Fire
—It Neither Rusts
Nor Does It Decay!"

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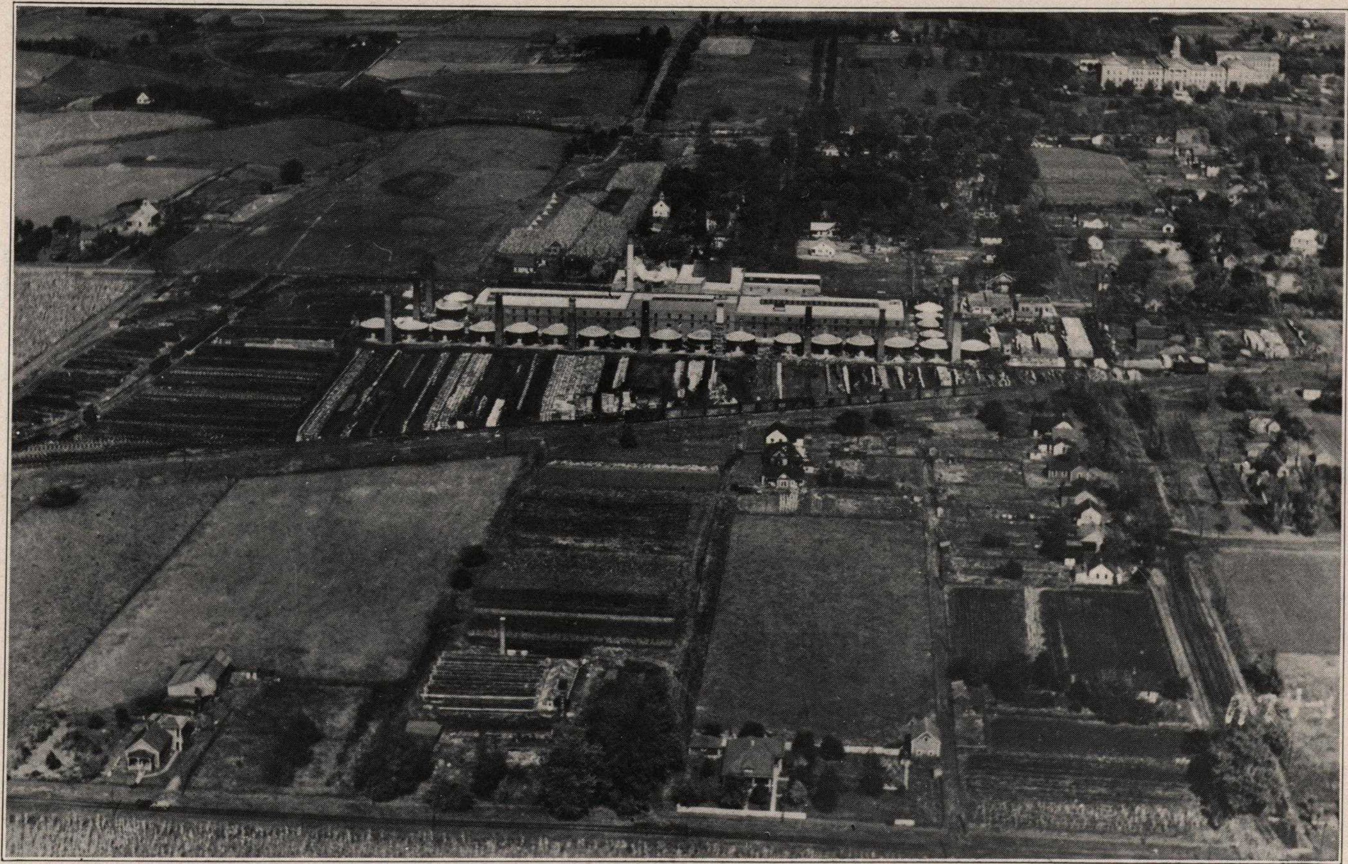
FOREWORD

Vitrified Salt Glazed Clay Sewer Pipe is the one material used in engineering construction which is not subject to oxidation as iron and steel in the form of rust, decay as in wood, due to rotting caused by bacterial action, to disintegration due to the actions of acids and alkalies as is the case with many construction materials.

Vitrified Salt Glazed Clay Sewer Pipe is made of the indestructible residue CLAY, left after the elements of nature for countless ages have successfully broken down the sturdy granite mountains of this earth.

Vitrified Salt Glazed Clay Sewer Pipe has stood the test of time, the test of the elements, the test of fire and finally the tests of man made acids, alkalies and chemicals. It may be truly termed the "best of the best"—the everlasting material for

SEWERAGE CONSTRUCTION



AEROPLANE VIEW OF A MODERN VITRIFIED SALT GLAZED CLAY SEWER PIPE PLANT.

The Properties of a Sewerage Material

Before selecting the material for any type of construction it is most important and of primary necessity to determine the requirements and use to which that structure is to be subjected. This analysis for the requirements of a sewer is no different than any other structure; in fact, it is more important as the sewer is not subject to the daily observations and inspections which are given to structures above ground. Sewers are constructed (buried many feet in depth in the ground) and are only inspected when some stoppage or defect necessitates the examination. It is therefore obviously important that all persons who propose or contemplate sewerage construction should have, at the times when they are giving consideration to this type of engineering work, the requirements of a sewerage material. The material of which sewers are constructed should possess the following properties:

PERMANENCE
DENSITY AND IMPERVIOUSNESS
SMOOTHNESS
STRENGTH
PRACTICABILITY

oOo

PERMANENCE

A sewer material should have permanence because it is a principle of municipal economy that when a town borrows money to pay for an improvement it must be able to pay back what it borrows before the improvement is worn out. In other words, a tangible, useful property should be at hand at the time of the payment of the last outstanding bond. Sewerage bonds are often issued by the municipality for a period of ten to twenty years, and the bonds are retired annually with interest, over the time period of the Bond issue.

In all cases where the sewerage works are constructed by special assessment or a special tax upon the property benefited, the sewers should be of permanent benefit to the property.

It is not infrequent for the property owners in some cities to be paying concurrently for two street pavements, the first having been replaced with a newer one and in some rare instances the people are now paying for three pavements at once on the same street—two that have worn out and one that is wearing out.

Although a municipality may venture to experiment with various types of paving materials on the surface of its streets, to adopt a similar practice in sewerage work would seriously interfere with the public welfare, affect the health of the community and the transaction of business, by keeping the town continually torn up. This would result in large expenditures of money from the public treasury. Sewers, being underground and inaccessible, must be permanent as the defects of sewers cannot be ascertained except by the making of periodic inspections. A pavement in need of patching may not affect the health of a community; a sewer in need of patching, or repairing, has often been known to cause serious epidemics by the pollution of water supplies.

A sewer pipe should be permanent because the pipe item of a sewer job is only about one-fourth or less of the total cost. If for any reason this one-fourth must be repaired, it means doing over again the other three-fourths of the job.

The cycle of public improvements is such that upon the completion of the water supply and sewerage systems the people demand permanent pavements so that not only does the repairing of the sewer pipes require the cost items of excavation, new sewer pipes and backfilling, but to this is added the enormous cost of tearing up the pavement, the maintenance of the sewerage flow during reconstruction period, and finally, the replacement of the pavement.

It is therefore poor economy and poor business to save, at the most, 10% on the kind of sewer pipe when in the aggregate it means but 2½% of the whole cost of the construction and, if not permanent, may result in an additional expense in the form of an entirely new construction, together with the expense of replacement of other improvements.

A sewer pipe to be permanent must be able to resist chemical action; first, due to the ground waters and soil on the outside of the pipe; second, due to the action of the putrefaction of sewage within the pipe, and third, due to the action of kitchen wastes and trade wastes within the pipe.

The acidity and alkalinity of the ground waters is of common occurrence in various parts of this country. Tannic acid, and peat soil acids are frequently encountered, and carbonic acid is present in all ground waters, while other large areas of this country contain large quantities of alkalies in the form of sulphates and chlorides, all of which have been known to disintegrate the outside of certain kinds of construction materials.

The putrefaction of sewage conveyed within the sewer has, in many instances, affected the interior of these structures, due to the formation of hydrogen sulphide and sulphuric acid.

The housewife always keeps sauerkraut, pickles, etc., in stoneware jars, which are made of vitrified clay, and at the beginning of the preserving seasons dumps the old liquor into the kitchen sink. These liquors often contain acetic, citric and other acids which have no effect upon vitrified salt-glazed clay sewer pipe. Nor is it uncommon for the housewife to dump milk which has soured into the kitchen sink. Sour milk contains lactic acid, which does not corrode vitrified salt-glazed clay sewer pipe.

Soil pipes are often stopped or plugged with grease from kitchen wastes. The grease is often removed with large quantities of strong alkalies such as soda, potash or some proprietary combination, none of which has any effect upon vitrified salt-glazed clay sewer pipe.

If the material of which sewers are constructed is not everlasting, the expenditure for repairs will be many, many times the original cost of the material which is replaced. In addition to this, the public official recognizes the fact that all repairs will be charged to the corporate or general fund of the municipality and when it is further recognized that these funds in most cities are already woefully inadequate and insufficient, it will be apparent that this type of experimentation is done at the expense of police, fire, health, education and other much needed activities.

DENSITY AND IMPERVIOUSNESS

Density and Imperviousness mean much the same thing; that is, a material which is dense, solid, without pores in it, will not leak. A sewer pipe is required to be dense and water-tight because as all health officials and sanitary engineers will agree that a sewer must carry *all* its contents or the sewage to the place of disposal without creating a nuisance. If sewage is permitted to leak from the pipes, it will contaminate the ground around the leak, the wells nearby, and may even leak into adjacent cellars.

If ground water is permitted to leak into a porous sewer, it taxes its capacity and seriously interferes with any sewage disposal methods, greatly increases the size of any pumping machinery required at the outlet, and hence results in an ever-increasing annual charge for pumping.

A dense and impervious material will not permit certain fungus growths that could grow on and take root in the pores of a leaky structure and grow until they clog the pipe; nor permit the roots of trees to work their way through the walls of the sewer, again causing the clogging of the sewer.

A sewer should be made of dense material to resist erosion which takes place when grit, sand or gravel is carried in the flowing sewage. A dense, impervious material will also resist many destructive chemical actions which can and do take place in sewers.

SMOOTHNESS

Smoothness is required in a sewer material because a smooth pipe is capable of carrying more sewage than a rough one. With the same slope or fall in a smooth pipe the sewage has a greater velocity (will flow faster), and thus leave less deposits in the sewer.

STRENGTH

Strength of sewer pipe should be sufficient to sustain the load of the earth or the backfilling above it and resist the ordinary internal pressures to which sewers are sometimes subjected.

Sewer pipe has limitations as to strength and is manufactured to meet the strength requirements of the specifications of the American Society for Testing Materials. Sewer pipe without a sufficient covering of earth or filling cannot be expected to stand the direct impact due to moving vehicles on streets and highways nor to withstand the stresses and strains from improper, unequal and insufficient foundations.

PRACTICABILITY

Practicability. A sewerage material must be practical; first, from the standpoint of the manufacturer so it can be made cheaply and shipped promptly, according to specifications, capable of fulfillment without unusual, special or patented devices; second, from the standpoint of the contractor, so it can be installed by simple means, by ordinary labor and with assured results; and third, from the standpoint of the purchaser, so it can be easily tested and inspected.

THE MANUFACTURING OF VITRIFIED SALT GLAZED CLAY SEWER PIPE

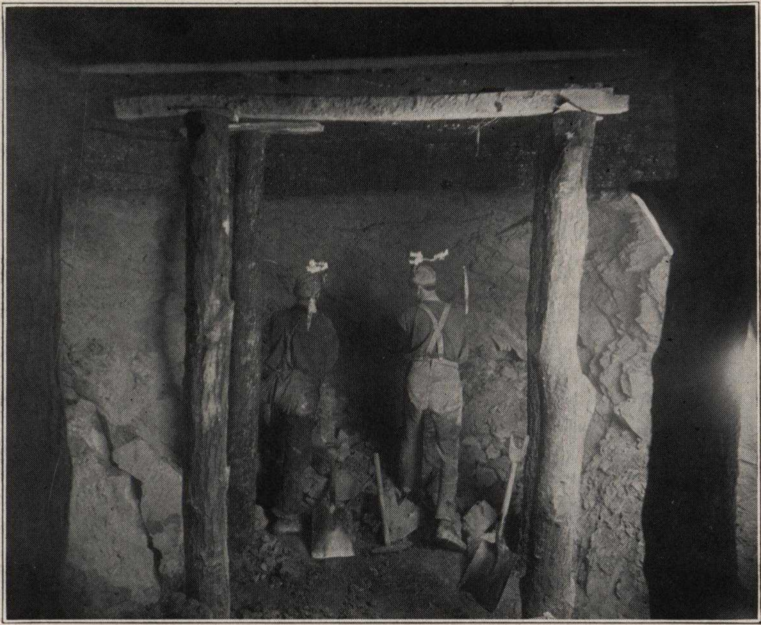
CLAY

Since consideration has been given to the five principal qualities that a good sewerage material must have to fulfill its purpose: permanence, density, smoothness, strength, and practicability, let brief consideration be given to the basic material clay and the several processes in the manufacture of clay.

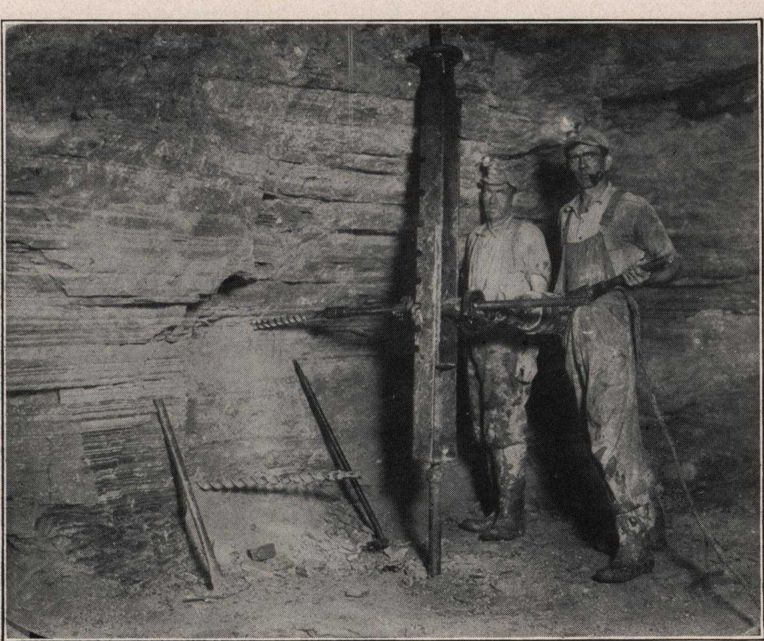
Interest in almost any structural material can be increased by a description of its manufacture, if, as in the case of sewer pipe, this process of manufacture is one calculated to give it superior qualities, then the mere interest can be turned into a greater appreciation and a desire for the use of the product.

In discussing the materials of manufacture of sewer pipe, manifestly the first item for consideration is clay.

Clay is a material which has been selected by nature for its endurance. It is what is left after nature's elements have gradually attacked the original granite mountains of our earth. Of all the materials which the elements have washed out of these granite moun-



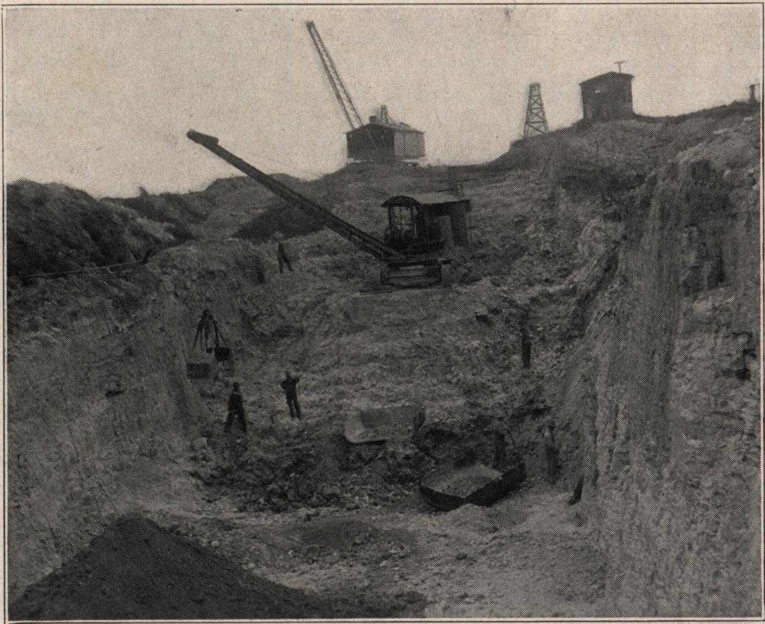
EXCAVATING FIRE CLAY BY MINING.



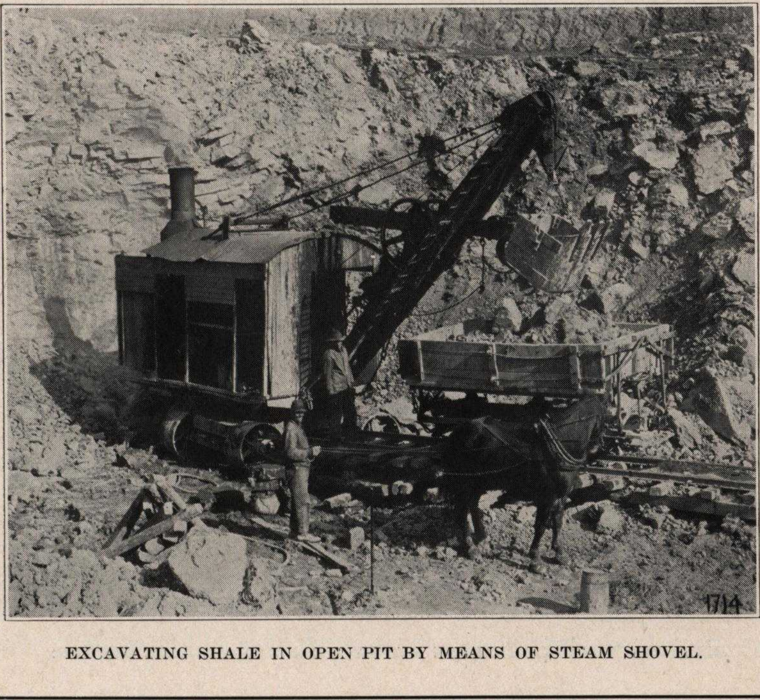
DRILLING BLAST HOLES IN SHALE MINE.

QUARRYING SHALE IN OPEN PIT USING HAND EXCAVATION.

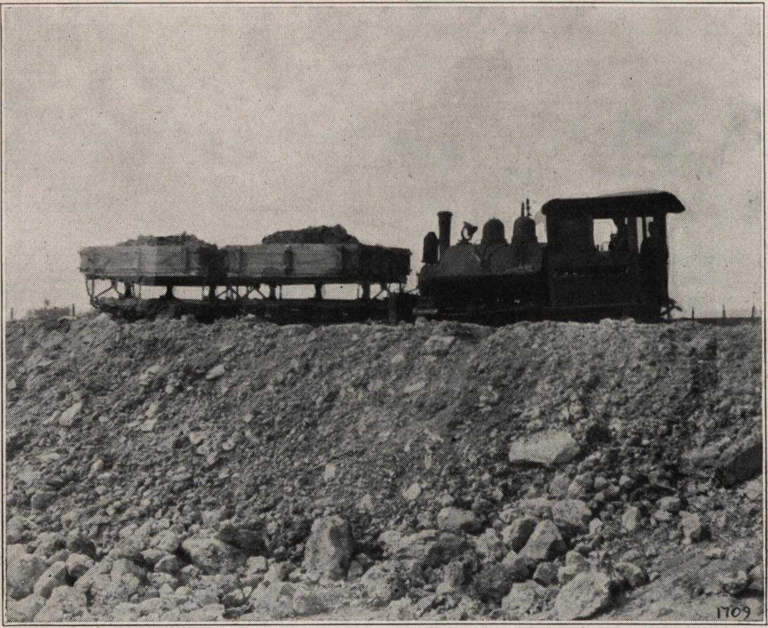
EXCAVATING SHALE WITH CLAM SHELL IN OPEN PIT.



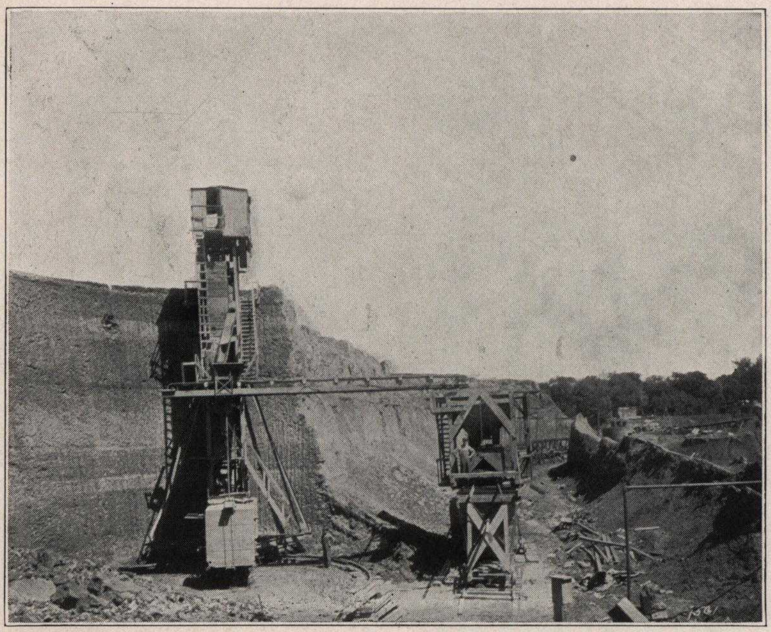
EXCAVATING SHALE IN OPEN PIT WITH CLAM SHELL AND DRAG LINE.



EXCAVATING SHALE IN OPEN PIT BY MEANS OF STEAM SHOVEL.



CONVEYING SHALE FROM QUARRY TO STORAGE BINS AT PLANT.



EXCAVATING SHALE IN OPEN PIT BY MEANS OF A SHALE PLANER.

tains, such as salt, gypsum, limestone and other alkalies which are easily dissolved, clay alone remains undissolved and unchanged.

Clay may be found under two general conditions; one where the granite rocks have weathered, leaving the clay in its place, and the other where the clay has been leached by streams of water from the place where it was formed, transported by these streams and deposited at lower levels in quiet pools at some point along the course of the stream. This finely divided water-borne clay was settled out in beds and later, under the action of geological pressure, was formed into more or less hard structures of a rigid nature, almost the character of rock.

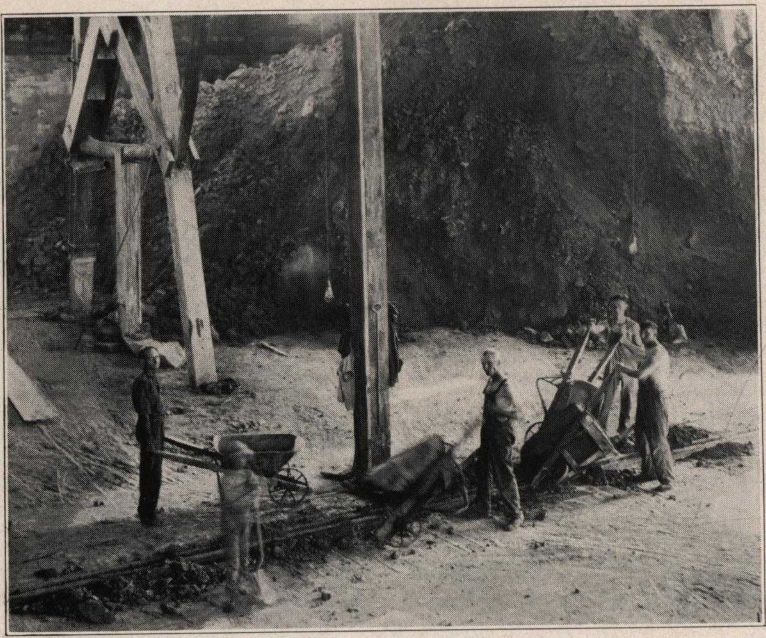
Clays which are formed with a considerable amount of silica in them take on the properties of refractory or fire clays, while grouped under the general term of shales are those clays which have less silica, but may contain a wide range of color, hardness and mineral composition. Iron and manganese give a red color to the clay and results in a reddish, burned material, while the absence of iron and manganese result in a white or gray burned material. It may be noted in passing that most shales contain more or less iron. This may be accounted for by the fact that the same water which carried the clay along to its final resting place, also carried iron in solution, which gives the red body color to the finished pipe and which also has given rise in the minds of many persons that all pipe must be of a dark red color to be good sewer pipe.

After the manufacturer has located the deposit of clay, he is confronted with the problem of mining or quarrying it.

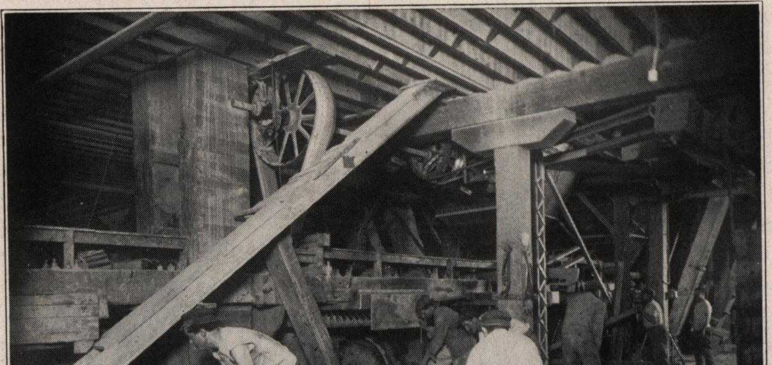
Many and diversified methods are used in the excavation of the clay, some deposits (fire clay) are mined similarly to coal or any mineral, but the majority of the clay or shale is quarried, using explosives, in which event the first step is the removal of the surface loam or the overburden. This is accomplished by means of steam shovels, drag lines, and cableways. The "stripping," as the above process is termed, having been completed, planers, steam shovels, drag lines and cableways are used for the excavation work, and the loosened clay loaded on various types of conveyors. For this purpose there are used cars drawn by mules, electric, steam or gasoline locomotives, belt conveyors and cable ways.

MINING AND QUARRYING

Both fire clays and shales are used in the manufacture of vitrified salt-glazed clay sewer pipe. In general, fire clays are so hard in their original state that they must undergo a period of weathering or slaking before any attempt is made to utilize them in the manufacture of pipe. Shales, while they have much the character of rock, vary



CLAY STORAGE BIN AT PLANT.



CHARGING DRY GRINDERS OR DRY MILLS WITH RAW CLAY.

considerably in hardness and amount of moisture, and are seldom found sufficiently soft to be excavated without the use of special machinery or explosives.

Out of this material already selected by the forces of nature for its endurance, mankind, in the personage of a manufacturer, selects special deposits for their purity and uniformity—*"The best of the best"*—for the making of Vitrified Salt Glazed Clay Sewer Pipe.

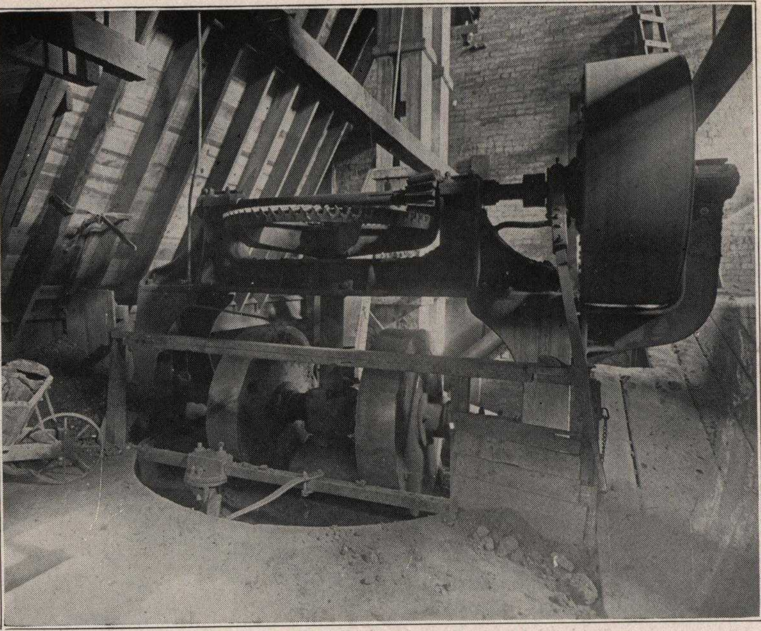
Approaching a vitrified salt-glazed clay sewer pipe factory, one is at once impressed with the magnitude of the plant. Many acres are needed for clay storage bins, coal storage buildings, kilns, and for the storage of the finished product. The endless line of cars loaded with nature's *"best of the best"* and most enduring product, *Clay,* is first delivered to the various clay storage bins of the plant. There are generally several varieties of clay in the various strata in the same quarry, and the quarry men exercise care in the selection, loading only those kinds which when mixed will result in a perfect product. Each variety has a purpose; for example, the soft or "red" clay produces a more plastic body than the hard variety, thus making it easier to shape and handle during the pressing, or to give a darker, richer color to the burned product.

It may be desirable, before briefly describing the manufacturing processes, to look at the general layout of a plant. A clay sewer pipe plant consists essentially of one long building of three or four stories in height. On one side, adjacent to a track for the delivery of coal, is the power house. Located at about the middle of the main building are the clay storage bins. The cars of clay are brought into the storage bins, dumped, and later, by conveyors, carried into the grinding rooms. Arranged around three sides of the large main building are the beehive shaped kilns in which the pipe is burned; two kilns usually connected to one stack.

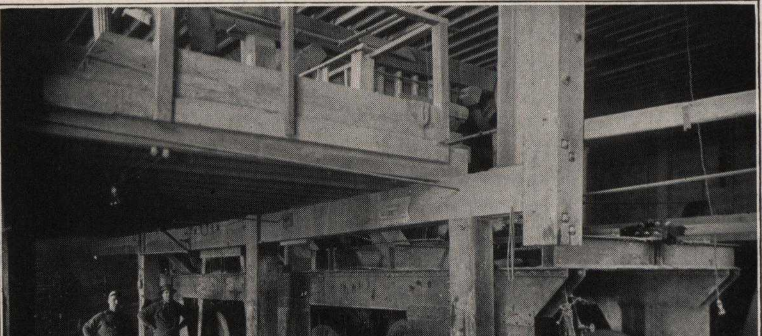
In the large main building all the processes in the manufacture of vitrified salt-glazed clay sewer pipe with the exception of burning are carried on.

GRINDING

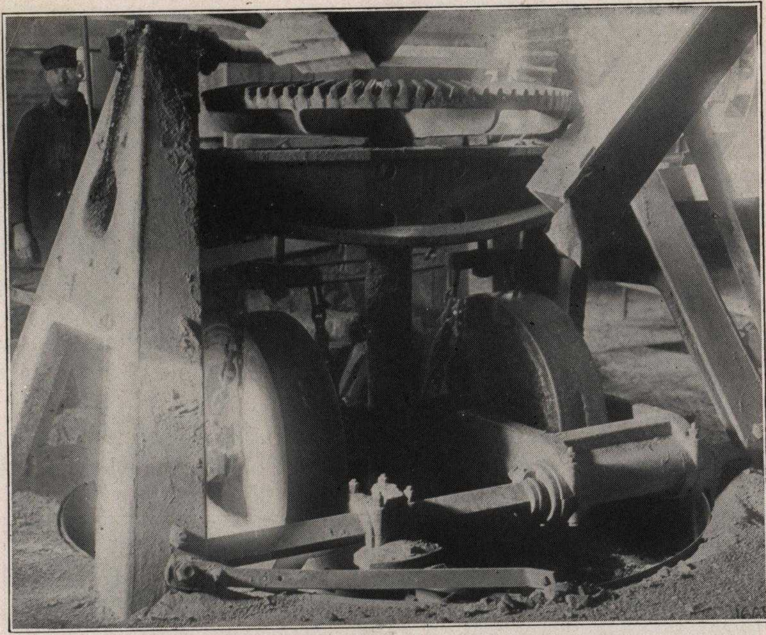
The "raw" clay is delivered either from the clay pit directly, from the storage bins, or from the out-door weathering piles, and is brought into the grinding room where it is discharged into the pans of the dry grinders or dry mills. The dry grinder or dry mill consists of a horizontal pan with a perforated cast iron bottom. This pan is attached to a vertical drive shaft, and riding on the bottom are two great cast iron wheels with steel tires weighing in some instances as much as four thousand pounds apiece. These wheels, or mullers, are mounted as idlers on horizontal bearings, and their revolution is pro-



DRY GRINDER OR PULVERIZING MILL SHOWING LARGE CAST IRON MULLERS.



GENERAL VIEW OF WET PAN OR TEMPERING MILL.



WET PAN WHERE GROUND CLAY IS TEMPERED.

duced by the turning of the pan itself. The horizontal bearings on which these mullers are mounted are arranged to permit a considerable latitude in the vertical motion.

A quantity of raw clay is dumped into the pan and is quickly ground into fine particles under the tread of these immense wheels. A deflecting plate deflects the clay continuously under them.

After the clay is ground in this manner and is broken up into particles small enough, the clay is pushed through the tiny slots in the bottom of the pan by a scraper into the hopper bottomed boot of a bucket conveyor which conveys it to the top of the building.

In the top floor of the building the pulverized dry clay is discharged over a long screen having 10 to 16 meshes to the inch, set at an angle of about 45 degrees. That portion of the ground clay which is fine enough, passes through the screen and is discharged through a spout into the ground clay storage bin, while those particles which are still too coarse to pass through the screen are rejected and are returned through another spout back to the dry pan for further grinding.

TEMPERING

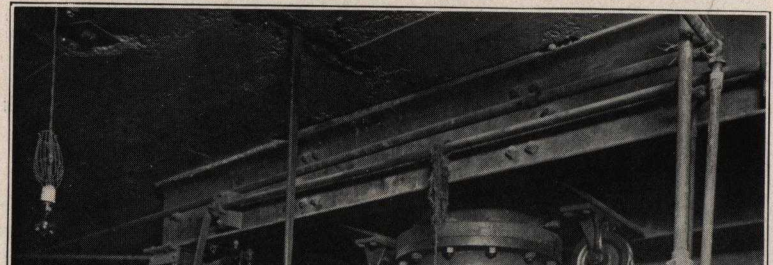
From storage bins the "ground clay" is conveyed to the wet pass, which are similar to the dry grinders with the exception that the bottom is not perforated. The mullers are narrower and revolve at a somewhat higher rate of speed. Here the water and the clay are thoroughly mixed (tempered, as it is called) into a dough of uniform consistency.

PRESSING

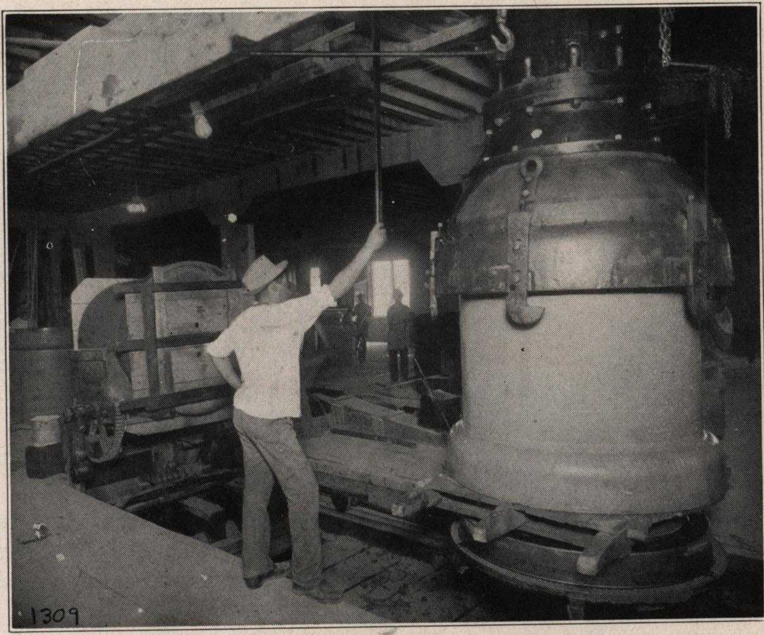
The tempered clay is discharged onto a conveyor, which in turn delivers it into the press. The steam cylinder of the press is about 4 feet in diameter and operates under a pressure of about 120 pounds per square inch, producing a total pressure of over 200,000 pounds, or about 100 tons.

The tempered clay fills the mud cylinder of the press and is forced out of the lower end of the press through the die in the form of a sewer pipe.

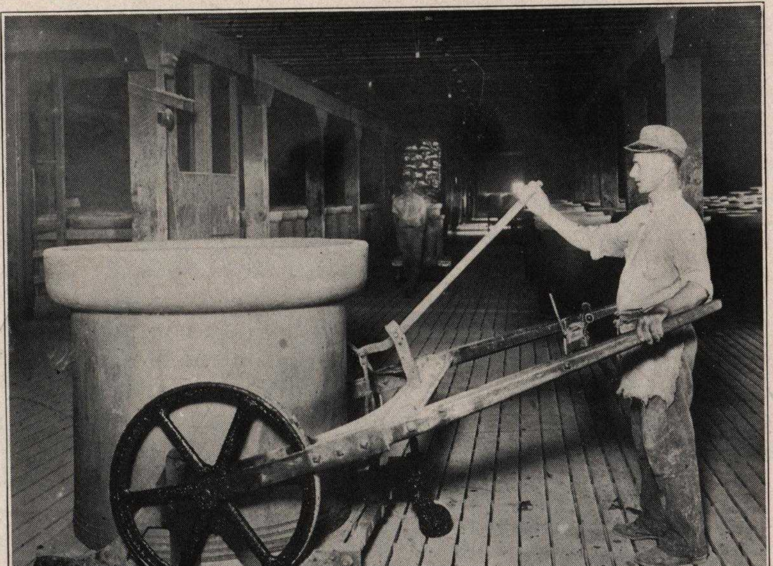
The great steam cylinder provides the pressure for the forcing of the clay down through the dies of the press. On the lower end of



PRESSING A SMALL CLAY SEWER PIPE.



PRESSING A LARGE CLAY SEWER PIPE.



SPECIALLY DESIGNED TRUCKS FOR TRUCKING LARGE SIZED CLAY SEWER PIPE.

this cylinder is the die which forms the hub and later the pipe proper. The die is supported on a balanced elevator rod. This rod is forced downward by the pressure of the issuing clay. In the orifice end of the clay cylinder the bell or hub is formed first and when the socket former portion of the die is released, the pipe issues in a cylindrical tube of the proper length.

The pipe as it issues from the press looks smooth and slick, and while it is possible to handle the smaller sizes by hand from the press without distorting their shape, much greater care must be used in handling the larger sizes. The pipe is made or pressed with the bell or hub end downward and must be turned end for end to dry. The larger sizes of pipe are turned in a cradle operated by machinery because of the weight of the pipe, while the smaller sizes are turned by the operators as it comes from the press.

The accompanying sketch shows the operation of a sewer pipe press.

The device for cutting off the pipe consists of a revolving knife on the inside of the orifice which makes a straight, even cut. From the press the large pipe is wheeled on specially constructed trucks and the small pipe on platform trucks, out to the dry room.

DRYING

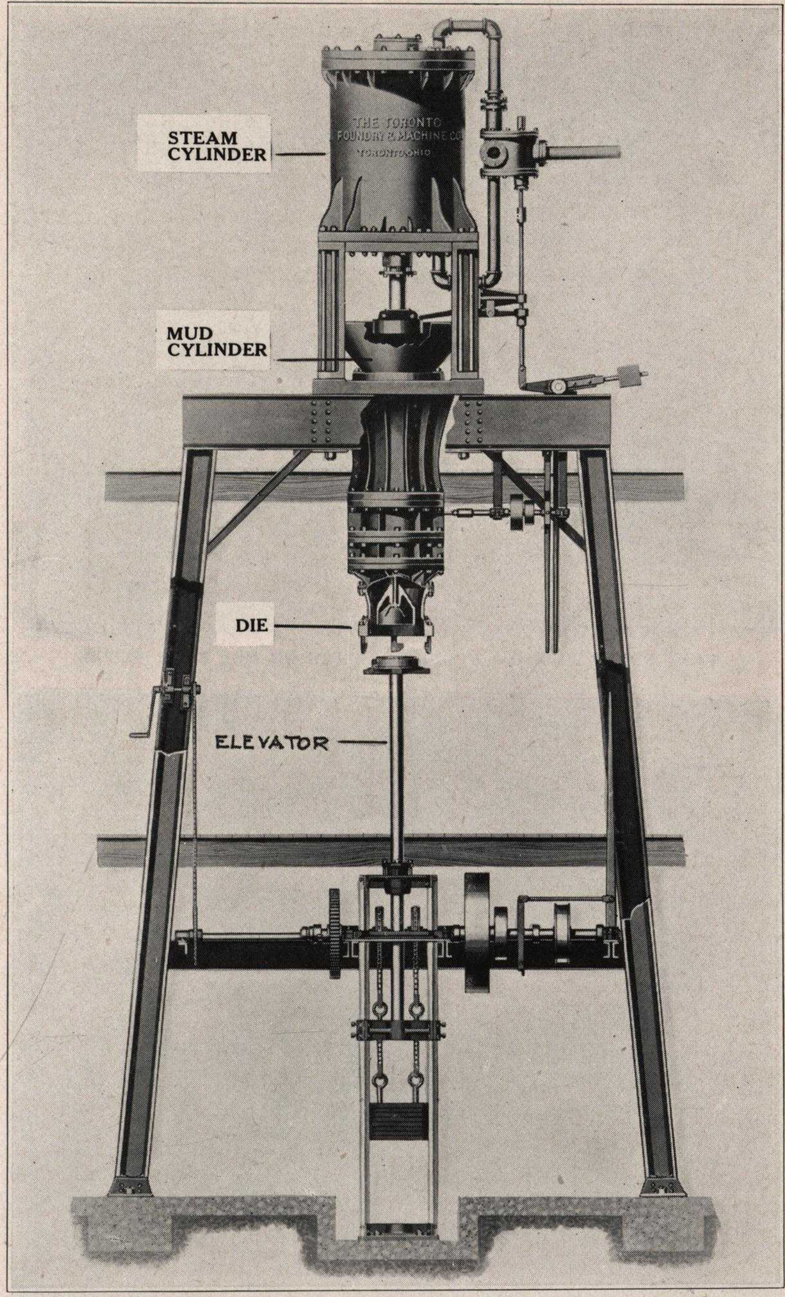
The dry room floor is especially constructed to insure a uniform temperature during the summer and winter in order that the pipe may dry out and shrink uniformly without cracking.

Immediately below the slotted floors in the dry room there are steam pipes through which exhaust steam is forced, which, together with the waste heat from the kilns, dry the pipe. The slotted floors permit a complete circulation of hot air. Some of the larger sizes of pipes remain as much as two weeks in this dry room.

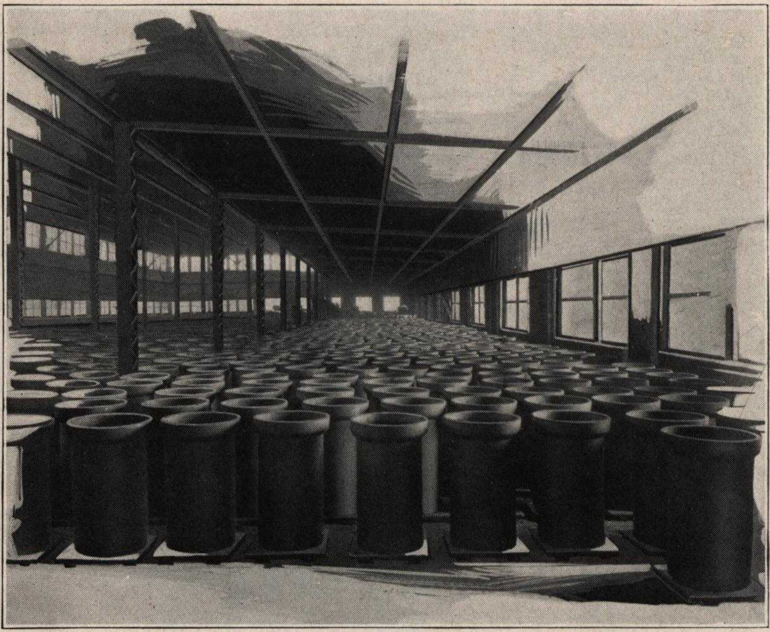
BURNING

From the dry room the pipe are taken into one of the beehive kilns. The floor of the kiln consists of large sized fire brick so laid as to span a small smoke duct. These small ducts are connected at the ends into a cross duct which in turn discharges into the main flue leading to the stack or chimney.

Arranged along the inside wall are the short chimneys from the fire boxes, which are called "Fire Bags." The heat from the fire rises to the top of the kiln, and thence downward through the sewer pipe or "set" ware, and out through the openings in the floor to the stack. The temperatures at the top and bottom of the kilns are recorded electrically by means of a Pyrometer.

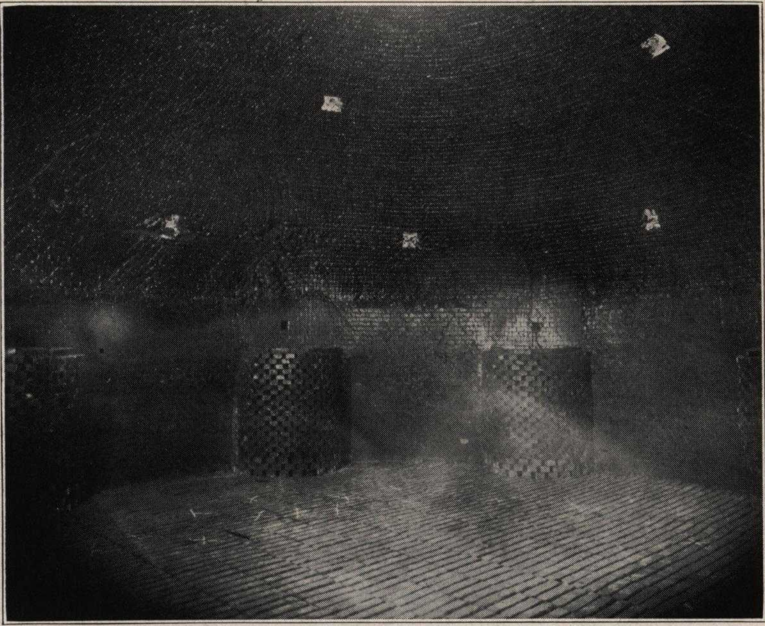


SECTIONAL VIEW OF SEWER PIPE PRESS SHOWING STEAM CYLINDER AND MUD CYLINDER ABOVE FIRST FLOOR, THE DIE SOCKET FORMING DEVICE AND THE ELEVATOR ON THE FIRST FLOOR AND THE MACHINERY IN THE BASEMENT.

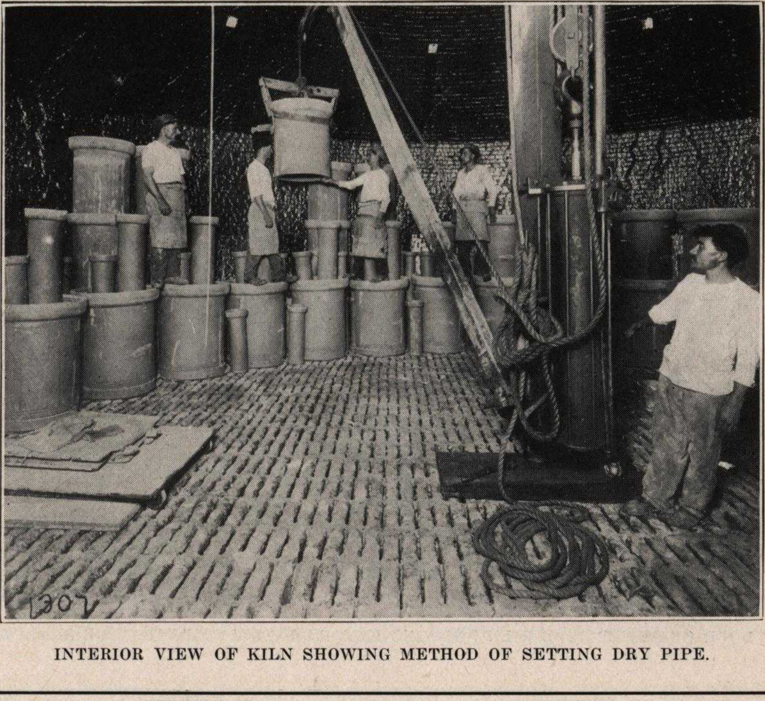


CLAY SEWER PIPE ON WOODEN PALLETS ON DRY ROOM FLOOR.

DRY ROOM FLOOR SHOWING SLOTS IN FLOOR TO PERMIT COMPLETE CIRCULATION OF WARM AIR.



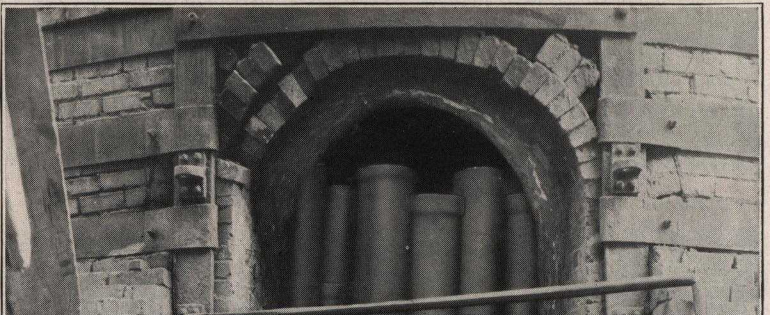
INTERIOR VIEW OF A CIRCULAR SEWER PIPE KILN SHOWING FIREBAGS.



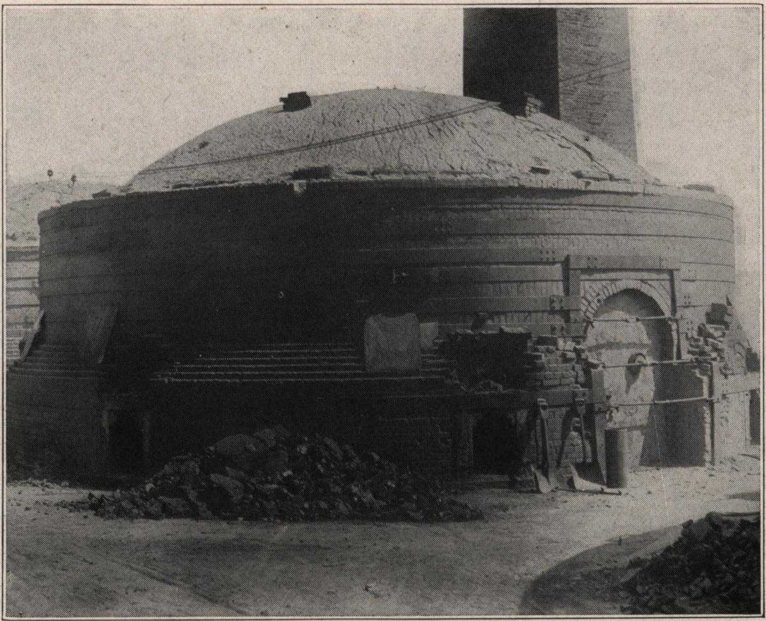
INTERIOR VIEW OF KILN SHOWING METHOD OF SETTING DRY PIPE.

In the setting of pipe in the kiln, small sizes are nested inside of larger sizes, but in such a way that there is complete circulation and draft around every piece. The pipe when set in the kiln are quite hard and dry.

The pipe as it comes from the dry room still contains about 3% of moisture, and the burning, after the kiln is set and sealed, begins with very small fires so that this moisture can be driven off without cracking the pipe. If the heat is developed too rapidly, steam may be formed within the body of the pipe, which literally causes the pipe to explode and be ruined. A temperature not exceeding 300 degrees Fahrenheit is maintained for a number of hours. This period of time is known as the period of ''water smoking'' and is for the purpose of taking *all* the moisture out of the pipe.



DOOR OF SEWER PIPE KILN SHOWING KILN LOADED AND READY FOR SEALING.



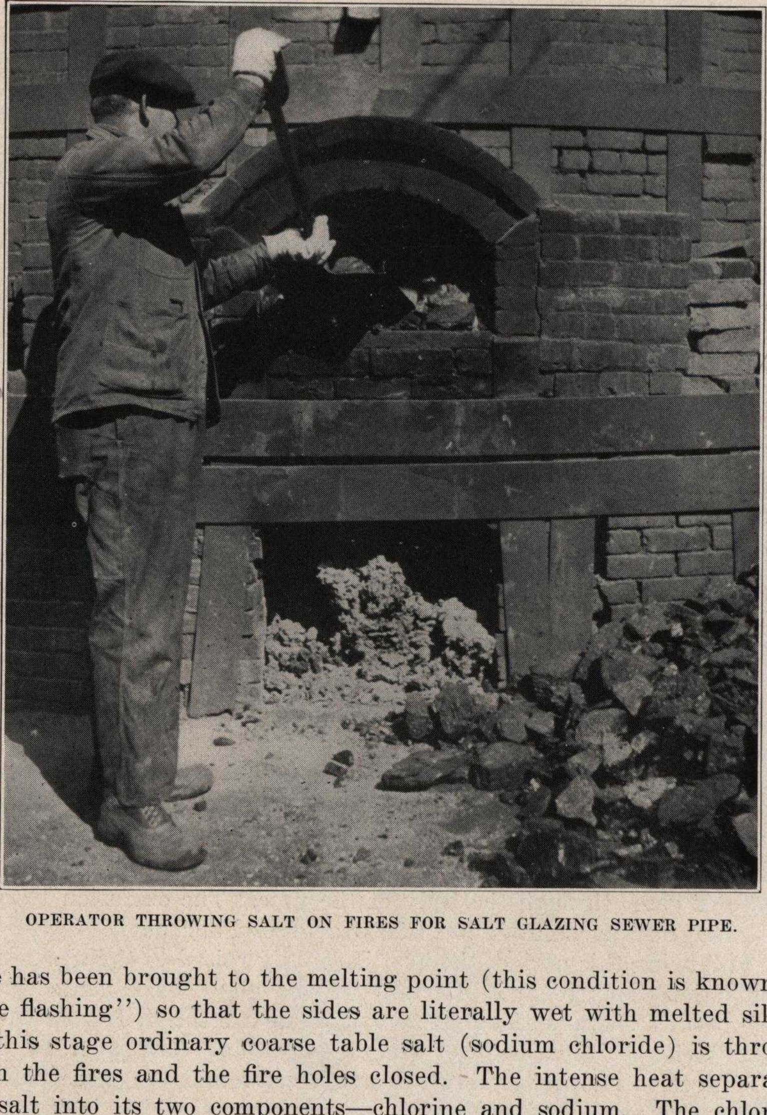
GENERAL VIEW OF SEWER PIPE KILN WITH DOORS SEALED SHOWING FIREBOXES.

After the water smoking period has all been completed, the temperature is rapidly increased to about 1200 degrees Fahrenheit, at which time the so-called oxidation period begins. There is in the clay considerable organic matter, especially in the water transported clays, together with certain mineral constituents which cannot stand the high degree of temperature required for vitrification. The firing during this stage must be carefully conducted so as to permit the release of gases through the body of the pipe. The oxidation temperatures range from about 1200 to 1400 degrees Fahrenheit.

Following this period, the heat is rapidly raised to the sintering or vitrification temperature. Certain of the clay constituents have a higher heat resistance than others, and these are the skeleton structure upon which the whole body of the pipe is hung. The particles which are subject to melting by heat, flow and surround the more resistant particles, forming a dense, hard, coherent mass which is known as vitrification. The temperature to produce the vitrification varies somewhat with the character of the clay from which the pipe is made, but in general the finishing temperature is from 2000 to 2200 degrees Fahrenheit.

GLAZING

When the temperature of the kiln has reached 2000 degrees Fahrenheit or more, the silica in the outer and inner surfaces of the



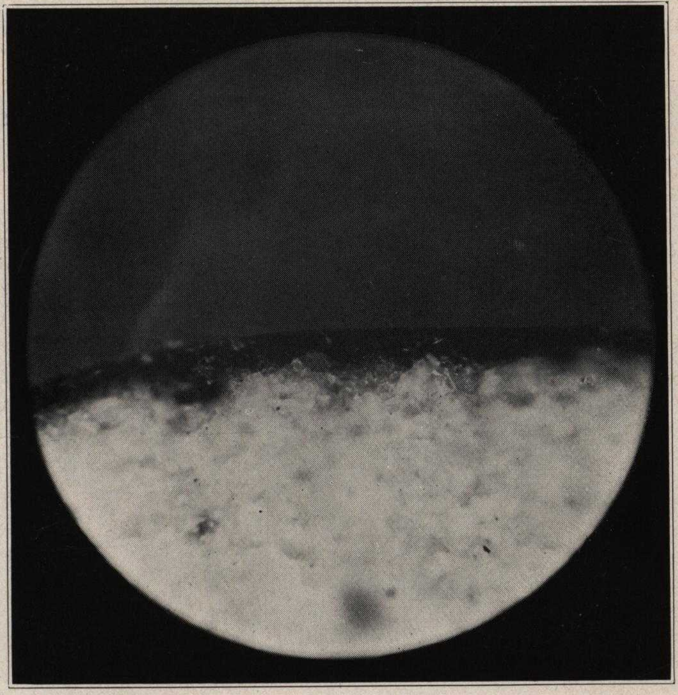
OPERATOR THROWING SALT ON FIRES FOR SALT GLAZING SEWER PIPE.

pipe has been brought to the melting point (this condition is known as "fire flashing") so that the sides are literally wet with melted silica. At this stage ordinary coarse table salt (sodium chloride) is thrown upon the fires and the fire holes closed. The intense heat separates the salt into its two components—chlorine and sodium. The chlorine of the salt passes off through the chimney as smoke, but the sodium is vaporized and combines chemically with the melted silica to form glass—the glaze—which chemically is known as "sodium silicate," and which is of the same composition as our ordinary window glass.

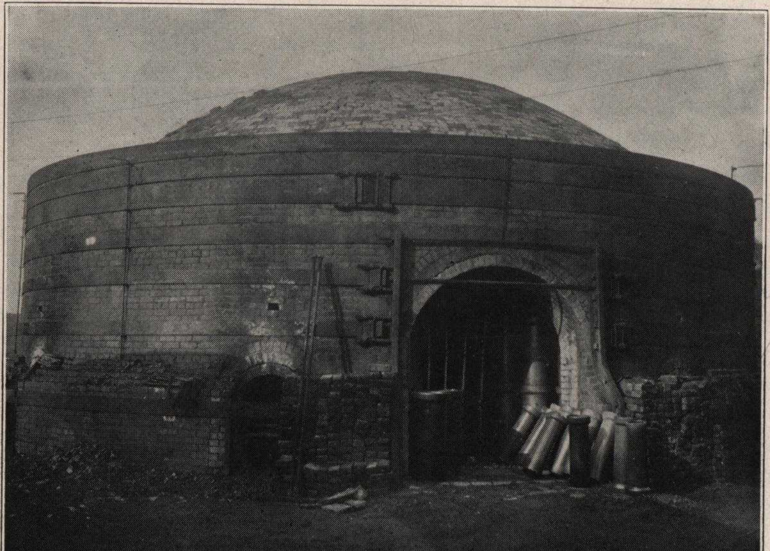
The entire process of burning sewer pipe takes from 2 to 12 days, depending upon the size of the pipe and ware.

The cooling of the kiln after the glazing has been completed is quite as important a process as the burning, because if the pipe cools too quickly the glaze may become cracked or crazed, or the pipe body cracked, known as air-checked. The temperature of the kiln is gradually reduced by slowly opening the top and the kiln door.

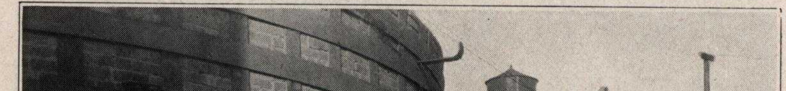
There has been briefly described the manufacture of straight pipe and a few words regarding the manufacturing of specials such as Y's, T's, curves, traps, reducers, etc., are necessary to complete this story. Y's and T's are made from two pipes which are delivered to the "branch" maker from the pipe press. In the main pipe or barrel there is cut, by means of a templet, a hole of a size equal to the outside diameter of the branch pipe. The branch pipe is cut in a form and then placed into the hole in the barrel, after which a piece of clay is pressed by hand around the joint on the outside, thus jointing the branch and the barrel. The inside of the branch is trimmed to the shape and contour of the "barrel". Other "specials," as traps, curves, reducers, etc., are usually cast in plaster of paris moulds and permitted to remain therein for a day or two.



MICROGRAPH SHOWING THICKNESS OF SALT GLAZE—
LIGHT PORTION VITRIFIED CLAY—
HORIZONTAL BAND IS GLASS—THE GLAZE.



SEWER PIPE KILN SHOWING DOOR OPEN PREPARATORY TO UNLOADING VITRIFIED SALT GLAZED CLAY SEWER PIPE.



TESTING VITRIFIED SALT GLAZED CLAY SEWER PIPE AS IT IS BEING REMOVED FROM KILN. NOTE MAN USING LIGHT HAMMER TESTING PIPE FOR SOUNDNESS.

VITRIFIED SALT GLAZED CLAY SEWER PIPE STORAGE YARD.

TYPICAL VIEW OF STORAGE YARD FOR SPECIALS AT SEWER PIPE PLANT.

When practically dry the forms are removed from the specials and taken to the dry room to complete this process. When burned in the kiln the specials are usually placed on the top tier or on top of the uppermost tier of straight pipe.

As already seen, vitrified salt-glazed clay sewer pipe is an example of the "survival of the fittest". First, nature has eliminated the most unfit substances; second, the manufacturer, in selecting his clay, has eliminated more unfit substances; third, the kiln fire eliminates what little remains to be discarded, and finally, covers this "best of the best" with a coating of glass.

Salt glazing is of value to clay sewer pipe for several reasons:

First, it makes the pipe smoother and enables it to convey more water than any other pipe of any other material that may be used for the purpose.

Second, it increases its imperviousness and prevents leakage.

Third, it furnishes a sanitary surface—*the only sanitary surface, in fact.*

A number of kinds of pipe are claimed to be glazed, but a glaze is defined in Webster's new dictionary as

(a) The vitreous coating of pottery or porcelain, especially one that is transparent, as distinguished from enamel.

(b) A smooth, glassy surface or bright polish.

(c) A smooth, slippery coating of ice.

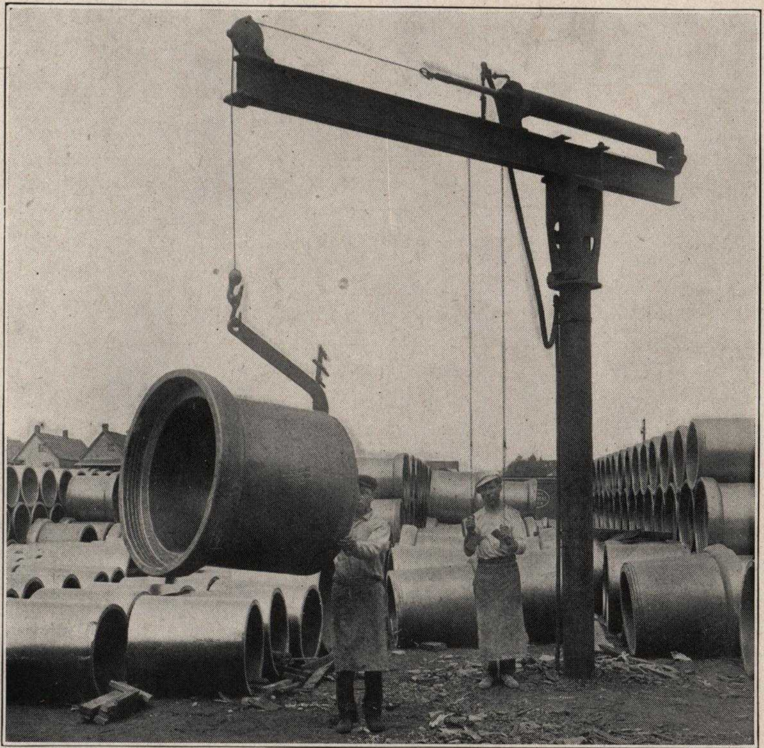
Since ice cannot exist at the temperature of sewage and sewer pipes cannot be polished till they shine, the vitreous or fire glaze is the only *real* glaze there is. This fire glazed surface is necessary and common to all sanitary articles—clay sewer pipes, bathroom fixtures, cooking utensils and hospital equipment.

To connect a finely glazed, up-to-date bathroom equipment to an unglazed sewer pipe would be the height of inconsistency. Salt glaze furnishes a visible guarantee that the pipe has been properly manufactured and, therefore, when the inspector sees a pipe well glazed he knows it reached the proper temperature in the kiln.

INSPECTION

There is a very important point that should be kept in mind in the manufacture of Vitrified Salt-Glazed Clay Sewer Pipe, which is, that all through this varied and expensive process these several operations requiring great skill—all are self checking. The purchaser need not fear the presence of adulterant in the mixing or in the manufacturing. The fire will find it for him and melt it out.

Vitrified salt-glazed clay sewer pipe is first sorted and inspected at the kiln as it is unloaded, then is placed in the storage yard. At



CRANE USED IN HANDLING LARGE SIZED VITRIFIED SALT GLAZED CLAY SEWER PIPE IN STORAGE YARD.

the storage yard it is again examined minutely for cracks, blisters and other imperfections.

Any defects which occur in the beginning of the manufacture of a piece of pipe or which are developed later in the process, are accentuated by the terrific heat at which the pipe is burned so that they are clearly and readily visible to the eye or noted in the tone when struck lightly with a small hammer.

The inspector can easily and quickly inspect *vitrified salt-glazed clay sewer pipe.* He can see external blemishes and his ear is quickly attuned to the difference in tone between the perfect and the imperfect pipe. One is impressed with this ease of inspection and how much this must mean to a municipality using this kind of pipe for their sewerage construction.

When Vitrified Salt-Glazed Clay Sewer Pipe is furnished to a municipality the element of uncertainty in quality has been eliminated and no fear need be exercised on account of poor workmanship and materials.

Dimensions of Sewer Pipe

STANDARD STRENGTH

Internal Diameter (D) Inches	Weight Per Foot	Laying Length (L) Feet	Inside Diameter at Mouth of Socket (Ds) Inches	Depth of Socket (Ls) Inches	Minimum Taper of Socket (H) Inches	Thickness of Socket (Ts) Inches	Annular Space (X) Inches	Outside Diameter at Mouth of Socket (Do) Inches	Thickness of Barrel (T) Inches
4	9	2	6	1½	1/16	7/16	⅜	6⅞	9/16
6	15	2	8⅜	2	⅛	½	7/16	9⅜	⅝
8	24	2 or 2½	10¾	2¼	⅛	9/16	½	11⅞	¾
10	33	2 or 2½	13	2½	⅛	11/16	½	14⅜	⅞
12	45	2 or 2½	15¼	2½	⅛	¾	½	16¾	1
15	65	2 or 2½	18½	2½	⅛	⅞	½	20¼	1⅛
18	85	2 or 2½	21⅞	3	3/16	15/16	½	23¾	1¼
21	120	2 or 2½	25½	3	3/16	1⅛	9/16	27¾	1½
24	150	2, 2½ or 3	28⅞	3	3/16	1¼	⅝	31⅜	1⅝
27	220	2½ or 3	32⅞	3½	3/16	1½	⅝	35⅞	2⅛
30	260	2½ or 3	36⅜	3½	3/16	1⅝	¾	39⅝	2¼
33	310	2½ or 3	39⅞	4	3/16	1¾	⅞	43⅜	2⅜
36	360	2½ or 3	43⅜	4	3/16	1⅞	1	47⅛	2½

DOUBLE STRENGTH ⊕

4	9	2	6	1½	1/16	7/16	⅜	6⅞	9/16
6	15	2	8⅜	2	⅛	½	7/16	9⅜	⅝
8	24	2 or 2½	10¾	2¼	⅛	9/16	½	11⅞	¾
10	33	2 or 2½	13	2½	⅛	11/16	½	14⅜	⅞
12	45	2 or 2½	15¼	2½	⅛	¾	½	16¾	1
15	75	2 or 2½	18¾	2½	⅛	15/16	½	20⅝	1¼
18	105	2 or 2½	22⅜	3	3/16	1⅛	½	24⅝	1½
21	145	2 or 2½	26	3	3/16	1 5/16	9/16	28⅝	1¾
24	185	2, 2½ or 3	29⅝	3	3/16	1½	⅝	32⅝	2
27	235	2½ or 3	33¼	3½	3/16	1⅝	⅝	36½	2¼
30	300	2½ or 3	37	3½	3/16	1⅞	¾	40¾	2½
33	350	2½ or 3	40⅜	4	3/16	2	⅞	44⅜	2⅝
36	385	2½ or 3	44	4	3/16	2	1	48	2¾

⊕ According to specifications of American Society for Testing Materials

SPECIFY AND USE

VITRIFIED SALT GLAZED CLAY SEWER PIPE

—FOR—

Sewerage Construction

In Sizes

4 INCHES TO 36 INCHES

For Larger Sizes of Sewers

USE

Segmental Blocks

Made of the Same Material as

VITRIFIED SALT GLAZED CLAY SEWER PIPE

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